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(54) Abstract Title

Automatic transmission control with gear failure sensing

(57) A damaged transmission gear in an automatic transmission is detected by a control system which analyses the vibration level of the transmission in each gear ratio, sensed by an acceleration sensor, and judges whether or not there is an abnormality. The transmission is then controlled in a new shift pattern which excludes the damaged transmission gear and so prevents an accident from occurring as a result of a gear failure. A warning signal is also generated to inform the driver of the gear malfunction.

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METHOD AND APPARATUS FOR CONTROLLING A MALFUNCTION
OF AN AUTOMATIC TRANSMISSION

The present invention relates to a method and an apparatus for controlling a
5 malfunction of an automatic transmission when a transmission gear of an automatic
transmission is damaged.

A transmission is an apparatus for smoothly changing the running speed of
automobiles. In general, transmissions are divided into a manual transmission which is
10 manually operated by drivers in accordance with a variation of the running speed of the
automobiles, and an automatic transmission which is automatically operated in accordance
with the variation of the running speed of the automobiles.

In the transmissions, a torque converter operates with the control of oil pressure,
and the torque operates in combination with a planet gear. Sensors which are mounted on
15 each portion of an automobile, sense present statuses concerning the running of the
automobile, and provide sensed status signals to a transmission control module to control
the automatic transmission.

The transmission control module controls the oil pressure control circuit in
response to the status signals which are sensed by the sensors and controls an operation of
20 a plurality of solenoid valves which are disposed on paths inside of oil pressure tubes.
When the pressure inside of the oil pressure tubes changes with the operation of the
plurality of solenoid valves, the operation status of the oil pressure changes applied to a
friction member is changed by the operation of a plurality of valve instruments which are
disposed on paths inside of the oil pressure tubes. Further, the friction member controls

the rotation status of the transmission gears which are disposed inside of a transmission gear train in response to the change of the operation status of the oil pressure, and speed-changes the rotation power, which is produced by an engine and a power transmission mechanism, to a desired rate of the speed change.

5 Accordingly, the automatic transmission which is rotated by the power from the engine, transmits to an output axis the rotation power from an input axis of the torque converter, which is connected to the engine, and makes the automobile move. When the driver applies pressure to the acceleration pedal in order to change the running speed of the automobile, each of the transmission gears, which are disposed inside of the transmission gear train, operates to change the running speed of the automobile.
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However, the transmission gears of the automatic transmission are worn out by friction while the automobile runs for a long time. Accordingly, when the transmission gear for a specific step number is damaged in the automatic transmission and when the damaged transmission gear is selected by the running speed of the automobile, the speed change cannot be made smoothly. Consequently, when the driver operates the acceleration
15 pedal, the malfunction of the damaged transmission gear can generate a traffic accident.

Therefore, it is a first object of the present invention to provide a method for sensing a malfunction of an automatic transmission and for controlling an operation of an automatic transmission to change a transmission pattern of transmission gear except for a damaged transmission gear of the automatic transmission.
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It is a second object of the present invention to provide an apparatus for sensing a malfunction of an automatic transmission and for controlling an operation of an automatic transmission to change a transmission pattern of transmission gear except for a damaged